

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

## FINAL EXAMINATION

TRIMESTER 2, 2017/2018

### BFN3174 – FINANCIAL MODELLING

( All sections / Groups )

16 MARCH 2018  
9.00 a.m. – 11.00 a.m.  
( 2 Hours )

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#### INSTRUCTIONS TO STUDENTS

- 1) This question paper consists of **FOUR (4)** printed pages (excluding the cover page) with **FOUR (4)** questions.
- 2) Answer **ALL FOUR** questions in **FOUR SEPARATE Excel** spreadsheets in **ONE SINGLE Excel file**.
- 3) Your Excel file should be named with your **STUDENT ID**, followed by your **NAME**, for example: 1111111623\_HISHAM.xls
- 4) **SAVE** your answers for all questions in the provided **THUMB-DRIVE**.
- 5) Mark distributions are shown in the given templates.

**Question 1 (25 Marks)**

Suppose you are looking to invest your money in the stocks of three firms - Firm A, Firm B and Firm C. The past 2 years' end-of-month returns of the three stocks are as shown in the table below:

Returns			
Year	Firm A	Firm B	Firm C
Jan-16			
Feb-16	0.015	-0.029	0.056
Mar-16	0.000	0.103	0.140
Apr-16	0.026	-0.035	-0.038
May-16	0.012	0.010	0.044
Jun-16	0.006	0.012	-0.003
Jul-16	0.009	0.002	0.290
Aug-16	0.094	0.002	-0.048
Sep-16	-0.101	0.004	-0.051
Oct-16	-0.022	0.002	0.027
Nov-16	-0.058	-0.023	-0.120
Dec-16	-0.036	-0.004	-0.034
Jan-17	0.000	0.006	-0.009
Feb-17	0.035	0.021	0.030
Mar-17	0.041	0.054	0.075
Apr-17	0.026	0.017	-0.027
May-17	0.003	0.013	0.033
Jun-17	0.026	0.030	0.033
Jul-17	-0.045	-0.037	0.019
Aug-17	0.011	0.008	0.045
Sep-17	0.011	-0.011	-0.007
Oct-17	-0.009	-0.006	0.015
Nov-17	-0.052	-0.071	0.012
Dec-17	0.003	-0.004	0.000

Required:

- Calculate the monthly and annual average and standard deviation of return for these three stocks.  
(12 marks)
- Calculate the variances of the three stocks and the covariances between the three stocks. You will need to produce the annualized variance-covariance matrix of the three stocks.  
(13 marks)

**Continued...**

**Question 2 (25 Marks)**

The past 2 years' end-of-month prices of two stocks, Stock A and Stock B, as well as the prices of the Market Index are as shown in the table below:

Date	Stock A	Stock B	Market
Jan-16	6.08	4.57	24.40
Feb-16	6.18	4.44	25.80
Mar-16	6.18	4.92	29.68
Apr-16	6.34	4.75	28.58
May-16	6.41	4.80	29.88
Jun-16	6.45	4.86	29.78
Jul-16	6.51	4.87	39.78
Aug-16	7.15	4.88	37.90
Sep-16	6.46	4.90	36.00
Oct-16	6.32	4.91	37.00
Nov-16	5.96	4.80	32.80
Dec-16	5.75	4.78	31.70
Jan-17	5.75	4.81	31.42
Feb-17	5.95	4.91	32.38
Mar-17	6.20	5.18	34.90
Apr-17	6.37	5.27	33.98
May-17	6.39	5.34	35.12
Jun-17	6.55	5.50	36.30
Jul-17	6.27	5.30	37.00
Aug-17	6.34	5.34	38.70
Sep-17	6.40	5.28	38.42
Oct-17	6.35	5.25	39.02
Nov-17	6.03	4.89	39.50
Dec-17	6.05	4.87	39.50

Required:

- a) Calculate the monthly returns for Stock A, Stock B and the Market Index. (3 marks)
- b) Calculate the mean monthly and mean annual returns for Stock A and Stock B. (4 marks)
- c) Calculate the beta of Stock A and Stock B using:
  - i. the slope function in Excel (4 marks)

**Continued...**

- ii. the formula for beta (6 marks)
- iii. the Data Analysis -> Regression Tool in Excel. Save the Regression analysis results in a new sheet and label the worksheet "Stock A Beta" for the result of Stock A and "Stock B Beta" for the result of Stock B. (8 marks)

### **Question 3 (25 Marks)**

Consider a European call option with the following parameters: stock price ( $S$ ) = 40, exercise price ( $X$ ) = 45, time to maturity ( $T$ ) = 6 months, volatility ( $\sigma$ ) = 45 percent, risk-free rate ( $r$ ) = 6 percent.

Required:

- a) Model this problem in Microsoft Excel. (5 marks)
- b) Calculate the intrinsic value of the option. (2 marks)
- c) Calculate the price of the option using the Black-Scholes option pricing model. (9 marks)
- d) Use **Excel Solver** to find the stock price for which there is the maximum difference between the Black-Scholes option price and the option's intrinsic value. You will need to copy the contents of Sheet "Q3" to Sheet "Q3\_Solver", execute the Solver tool there and keep the solutions of the Solver tool in that sheet. Also, printscreen the Solver Tool when you used it and then paste it in this sheet ("Q3\_Solver"). (Hint: First calculate the difference between the intrinsic value and the Black-Scholes price) (9 marks)

**Continued...**

**Question 4 (25 Marks)**

You are considering buying a 6% annual coupon bond that has 10 years to maturity. The face value of the bond is RM1000 and the current market interest rate for bonds of the same risk profile is 5%.

Required:

- a) What is the price of the bond?  
(10 marks)
- b) What is the duration of the bond?  
(3 marks)
- c) Show how changes in the coupon rate affect the bond's duration. Also plot a graph to illustrate the relationship between a bond's coupon rate and its duration.  
(Hint: Use **Data|Table** to do this)  
(8 marks)
- d) If the market interest rate changes to 5.5%, estimate the change in the price of the bond using the duration of the bond.  
(4 marks)

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